

# Neutron detection in the 2x2 demonstrator and ND-LAr

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The Deep Underground Neutrino Experiment (DUNE) wants to advance our understanding of neutrinos with remarkable precision. The main sources of detector systematic uncertainties are limitations of calibration and modeling of particles in the detector. Neutrons especially can account for up to 20% of the energy response uncertainty. In order to facilitate more accurate neutrino measurements in DUNE's far detector by addressing this uncertainty, we plan to study these neutrons with the DUNE near detector. Our approach involves identifying neutrons by associating disjointed proton tracks with a neutrino interaction vertex. The 2x2 demonstrator for the DUNE near detector, positioned at Fermilab's NuMI beamline, provides an ideal platform for developing these neutron studies. Featuring eight optically segmented volumes, the 2x2 configuration effectively mitigates light-pileup issues, enabling determination of the neutron time of flight and therefore the kinetic energy. In this poster, we discuss the methodologies and the preliminary findings of our neutron studies in the 2x2 demonstrator.

## Poster prize

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